

-1-

DESCRIPTION

METHOD AND APPARATUS FOR MANUFACTURING NATURAL INTESTINE SAUSAGES

TECHNICAL FIELD

The present invention relates to a method and an apparatus for manufacturing natural intestine sausages, which are used in the technical field of manufacturing sausages.

BACKGROUND ART

With conventional apparatuses for manufacturing natural intestine sausages, if an attempt is made to stuff a material up to a rear end portion of a natural intestine casing, the material is discharged from a nozzle by following the material which caused the rear end portion to be dislocated from the nozzle. This material is scattered without being stuffed into the rear end portion of the natural intestine casing, and not only has this been undesirable in sanitation, but a waste of the material has resulted. Thus, unless the material is stuffed up to the rear end portion for preventing the scattering of the material, the waste of the natural intestine casing occurs.

The present invention has been devised in view of the above-described aspects, and its first object is to provide a method and an apparatus for manufacturing natural intestine sausages, which make it possible to stuff the material up to the rear end portion of the natural intestine casing by establishing

DISCLOSURE OF THE INVENTION

To these ends, in accordance with the invention, there is provided a method for manufacturing natural intestine sausages, comprising the steps of: fitting a natural intestine casing over a stuffing tube in a state in which the natural intestine casing is divided into a shirred portion and a straight portion; causing an intestine pushing member to push and advance the shirred portion toward an intestine receiving member; pinching the shirred portion by and between the intestine pushing member and the intestine receiving member; detecting that the intestine pushing member has reached a predetermined position; pulling the natural intestine casing on the stuffing tube projecting from the intestine receiving

member and sliding the natural intestine casing on the stuffing tube by transporting the natural intestine casing, stuffed with a material, by transporting means for a predetermined time after the detection; and stopping the discharging of the material into the natural intestine casing after the lapse of a predetermined time.

In accordance with the invention, there is provided an apparatus for manufacturing natural intestine sausages including a stuffing tube having a distal end and adapted to stuff a material into a natural intestine casing, material supplying means for supplying the material into the stuffing tube, and transporting means disposed forwardly of the distal end of the stuffing tube and adapted to transport the natural intestine casing, stuffed with the material, in a direction away from the distal end, comprising: an intestine pushing member for pushing a rear end portion of the stuffing tube on the stuffing tube; intestine-pushing-member driving means for pushing and advancing the intestine pushing member toward the distal end of the stuffing tube; an intestine receiving member having a hole portion through which the distal end is passed so that the distal end of the stuffing tube is located in such a manner as to project on a transporting-means side, the intestine receiving member being adapted to receive the natural intestine casing being pushed by the intestine pushing member; detecting means for detecting a position of the intestine pushing member and generating a detection signal; and controlling

means for stopping the operation of the material supplying means in response to the detection signal.

In accordance with the method and the apparatus according to the above-described aspects of the invention, the movement of the natural intestine casing on the stuffing tube subsequent to the generation of the detection signal is made to follow the movement of the stuffed natural intestine casing which is transported by the transporting means, and the shirred portion of the natural intestine casing undergoes a change in form into a completely straight portion. Accordingly, it is possible to establish synchronization between the arrival of the rear end portion of the natural intestine casing at the distal end of the stuffing tube and the stopping of the supplying of the material into the stuffing tube by the material supplying means in response to the detection signal.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an explanatory front elevational view of a preferred embodiment of the invention;

Fig. 2 is an explanatory front elevational view of another preferred embodiment of the invention;

Fig. 3 is an explanatory front elevational view of still another preferred embodiment of the invention;

Fig. 4 is a partly enlarged front elevational view for explaining the structure and operation of the embodiment shown

in Fig. 3;

Fig. 5 is a partly enlarged front elevational view for explaining the structure and operation of the embodiment shown in Fig. 3;

Fig. 6 is a partly enlarged explanatory plan view of the embodiment shown in Fig. 3;

Fig. 7 is a partly enlarged front elevational view for explaining another method of detection in the embodiment shown in Fig. 3;

Fig. 8 is a partly enlarged front elevational view for explaining another example of an intestine receiving member in the embodiment shown in Fig. 3; and

Fig. 9 is an explanatory front elevational view of a further preferred embodiment of the invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the accompanying drawings illustrating preferred embodiments of the invention, a more detailed description will be given of the embodiments of the invention. It should be noted that the invention is not limited to these embodiments.

In Fig. 1, reference numeral 1 denotes an apparatus for manufacturing natural intestine sausages; 2, a device for stopping the charging of a sausage material constituted by ground meat or a meat emulsion (hereafter referred to as the material) into a natural intestine casing 5; 3, a material supplying means for

supplying the material into a stuffing tube 4; 4A, a distal end of the stuffing tube 4 for discharging the material; 4, the stuffing tube adapted to rotate in the direction of arrow A while supporting the natural intestine casing 5 and stuffing the material into it; 5, the natural intestine casing including a shirred portion 5A, a straight portion 5B, a rear end portion 5C, and a front end portion 5D of the shirred portion 5A; and 6, an intestine pushing member having an intestine pushing surface 6A for pushing the rear end portion 5C of the natural intestine casing 5 and a hole 6B through which the stuffing tube 4 is passed. Reference numeral 7 denotes an intestine-pushing-member driving means for pushing and advancing the intestine pushing member 6 toward the distal end 4A of the stuffing tube 4, and numeral 8 denotes an intestine-receiving-member attaching member constituted by a rotating pulley and adapted to rotate in the direction of arrow A in synchronism with the stuffing tube 4. The intestine-receiving-member attaching member 8 has an end face 8B facing the intestine pushing member 6 side, an end face 8C facing the transporting means 11 side, and hole portions 8A1 and 8A2 which are respectively formed in such a manner as to penetrate both end faces 8B and 8C, an intestine receiving member 9 being fitted in the hole portion 8A1. The intestine receiving member 9 has an intestine receiving surface 9A for receiving the shirred portion 5A pushed by the intestine pushing member 6 and a hole portion 9B through which the straight portion 5B is passed; 10, a braking

member which is provided with a hole portion 10A having a portion engaging an outer surface of the straight portion 5B and is adapted to brake the movement of the straight portion 5B in the direction toward the distal end 4A; 11, a transporting means including a pair of wrapping connectors 22 which travel at a transporting speed V in the direction of arrow B, rotating shafts 23 for driving the wrapping connectors 22, and a motor 24 for driving the rotating shafts 23. The transporting means 11 pinches a stuffed natural intestine casing 12, which has been stuffed with the material, from its outer sides and transports it at a predetermined speed. Reference numeral 13 denotes a detecting means for detecting the mutual contact between the intestine pushing surface 6A and the intestine receiving surface 9A, i.e., for detecting the position of the intestine pushing surface 6A with respect to the intestine receiving surface 9A, and for transmitting a detection signal 14 to a controlling means 15 and the intestine-pushing-member driving means 7. The detecting means 13 has a proximity sensor. The controlling means 15 is used to stop the operation of the material supplying means 3 based on the detection signal 14 and change the transporting speed V of the transporting means 11, as required. Reference numeral 19 denotes a second detecting means for detecting that the intestine pushing surface 6A and the intestine receiving surface 9A have faced each other with a predetermined interval D therebetween, and for transmitting a second detection signal 20 to the intestine-pushing-member driving means 7, and the second

detecting means 19 has a proximity sensor.

The stuffing tube 4 is disposed with respect to the intestine-receiving-member attaching member 8 such that the distal end 4A of the stuffing tube 4 is positioned in such a manner as to project by the length L toward the transporting means 11 side from the end face 8C of the intestine-receiving-member attaching member 8 facing the transporting means 11 side.

The intestine-receiving-member attaching member 8 may not necessarily be adapted to rotate. It suffices if the intestine receiving member 9 and the braking member 10 which are fitted in the hole portion 8A1 are attached to the intestine-receiving-member attaching member 8, which is in a stationary state, in such a manner as to be rotatable in the direction of arrow A. Furthermore, the intestine receiving member 9 and the braking member 10 may be unrotatably attached to the intestine-receiving-member attaching member 8 which is in an unrotatable stationary state.

The intestine receiving member 9 is provided by being fitted in the hole portion 8A1 so that the intestine receiving surface 9A is positioned in such a manner as to project from the end face 8B toward the detecting means 19 side, i.e., so that the intestine receiving surface 9A is located outside the hole portion 8A1. The braking member 10 is positioned closer to the distal end 4A side than the intestine receiving surface 9A in the state in which the braking member 10 is in contact with the intestine receiving member 9, and the distal end 4A is positioned in such a manner as to project

by the length l from the braking member 10 and by the length LL from the intestine receiving surface 9A. The lengths l and LL can be set changeably depending on the ease of slippage of the natural intestine casing 5 used on the stuffing tube 4.

The intestine-pushing-member driving means 7 is a means for generating a pushing and advancing force FF with respect to the intestine pushing member 6. For example, the intestine-pushing-member driving means 7 may be such as a means using an air cylinder with a rod, a means using a rodless air cylinder, a means for blowing air, a means using a spring force, a means using a magnetic force, a means using an elastic member such as rubber, or other means including, for example, a manual force, and each of these means may be used, as required.

It is preferred that the intestine receiving member 9 have such rigidity that it is not deformed by being pressed by the intestine pushing member 6, and have such a shape and be formed of such a material as to prevent the front end portion 5D from entering the interior of the hole portion 9B and easily allow the shirred portion 5A to undergo a change in form into the straight portion 5B. For example, the intestine receiving member 9 is a tubular member formed of a metal, a synthetic resin, or rubber, and its intestine receiving surface 9A has a flat shape, while its hole portion 9B has an inner peripheral portion opposing the outer peripheral surface of the stuffing tube 4 with a small gap therebetween.

The braking member 10 has such a shape and is formed of such a material as to brake the movement of the straight portion 5B in the direction toward the distal end 4A and permit the prevention of the entry of air into the straight portion 5B. For example, the braking member 10 is a resilient hollow cylindrical member formed of rubber, and is provided with the hole portion 10A having an inner peripheral portion which comes into close contact with the outer peripheral surface of the stuffing tube 4.

4-
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
2196
2197
2198
2199
2200
2201
2202
2203
2204
2205
2206
2207
2208
2209
2210
2211
2212
2213
2214
2215
221

9A. When the intestine pushing surface 6A is pushed and advanced to the position opposing the intestine receiving surface 9A with the predetermined interval D, the second detecting means 19 detects the intestine pushing member 6, and transmits the second detection signal 20 to the intestine-pushing-member driving means 7. Upon receiving the second detection signal 20, the intestine-pushing-member driving means 7 changes the manner of applying the pushing and advancing force FF with respect to the intestine pushing member 6 so as to push and advance the intestine pushing member 6 by continuously applying the pushing and advancing force FF to the intestine pushing member 6.

Upon receiving the continuous pushing and advancing force FF, the intestine pushing member 6 advances toward the intestine receiving surface 9A while pushing the rear end portion 5C. When all the shirred portion 5A which was placed between the intestine pushing surface 6A and the intestine receiving surface 9A is pulled out from the hole portion 9B, the intestine pushing surface 6A abuts against the intestine receiving surface 9A, so that the intestine pushing surface 6A and the intestine receiving surface 9A are brought into contact with each other. When the intestine pushing surface 6A reaches the position of abutment against the intestine receiving surface 9A, the detecting means 13 detects the intestine pushing member 6. Namely, the detecting means 13 detects that the intestine pushing surface 6A and the intestine receiving surface 9A have contacted each other, and transmits the

[illegible][illegible][illegible][illegible]

shaft 35, a number-of-revolution controlling device (an inverter, a driver for a servo motor) of the motor 24, or an electromagnetic switch for starting and stopping the motor 24. If the controlling means 15 upon receiving the detection signal 14 is arranged to decelerate the transporting speed V of the transporting means 11, the lengths l and LL can be shortened appropriately, so that this arrangement is suitable for use of the natural intestine casing 5 of the type which is difficult to slide on the stuffing tube 4.

Since this apparatus 1 is so arranged that the pushing and advancing force FF is applied continuously after the pushing and advancing force FF is applied intermittently, the excessive pushing of the natural intestine casing 5 is difficult to occur, and high detection accuracy can be realized. Further, since the intestine receiving surface 9A is positioned in such a manner as to project from the end face 8B toward the detecting means 19 side, the material attached to the intestine receiving surface 9A can be easily removed, thereby facilitating the maintenance of high detection accuracy. Even if the intestine receiving surface 9A is positioned flush with the end face 8B, a similar advantage can be obtained.

Until the material supplying means 3 stops the supply of the material after the generation of the detection signal 14, there is a time lag due to signal processing. In this embodiment, however, since the rear end portion 5C moves at a predetermined speed on the stuffing tube 4 having portions with the length l and the length

LL, it is possible to establish synchronization between the arrival of the rear end portion 5C at the distal end 4A and the stopping of the material charging. Since the natural intestine casing 5 which moves after the generation of the detection signal 14 does not have the shirred portion 5A, synchronization between the arrival of the rear end portion 5C at the distal end 4A and the stopping of the material charging can be controlled with higher accuracy. Further, since the rear end portion 5C of the intestine slides on the outer peripheral surface of the stuffing tube 4, the rear end portion 5C assumes the form of being completely stretched out, synchronization with higher accuracy can be attained.

In accordance with this apparatus 1, even if the shirred portion 5A including the rear end portion 5C of the natural intestine casing 5 having an extremely small thickness of, e.g., 0.03 mm, is present between the intestine pushing surface 6A and the intestine receiving surface 9A, these two surfaces 6A and 9A cannot come into contact with each other. Only when the shirred portion 5A including the rear end portion 5C has been pulled out from the gap between these two surfaces 6A and 9A, can these two surfaces come into contact with each other. Accordingly, this apparatus is suitable for reliably detecting the presence or absence of the rear end portion 5C of the natural intestine casing 5 which is extremely thin.

With the apparatus 1 shown in Fig. 1, the stopping of the supplying of the material is effected on the basis of the detection

signal 14 generated as the detecting means 13 detects the mutual contact between the intestine pushing surface 6A and intestine receiving surface 9A. However, as in the case of an apparatus 51 in accordance with another embodiment of the invention shown in Fig. 2, the stopping of the supplying of the material can be also effected on the basis of the detection signal 14 generated as the detecting means 13 detects a predetermined interval C determined by the intestine pushing surface 6A of the intestine pushing member 6 and the intestine receiving surface 9A of the intestine receiving member 9.

The apparatus 51 differs from the apparatus 1 in that the detecting means 13 detects the predetermined interval C, i.e., detects the position of the intestine pushing surface 6A with respect to the intestine receiving surface 9A, and generates the detection signal 14 for stopping the supplying of the material.

The intestine pushing member 6 of this apparatus 51 is a hollow cylindrical member formed of a resin, and has an annular member to be detected 25 which is fitted around its outer periphery and is formed of a metal. The intestine-pushing-member driving means 7 has an air blowing means 16 for blowing air AA onto the intestine pushing member 6, and the air blowing means 16 has an air nozzle 17 and an air-blowing-mode changing means 18 for changing the mode of blowing air onto the intestine pushing member 6 on the basis of the second detection signal 20 of the second detecting means 19.

The detecting means 13 has a proximity sensor for detecting the annular member to be detected 25, detects the predetermined interval C determined by the intestine pushing surface 6A and the intestine receiving surface 9A, and transmits the detection signal 14 to the controlling means 15 and the intestine-pushing-member driving means 7. The predetermined interval C can be set changeably by taking into account the magnitudes of the length l and the transporting speed V.

The second detecting means 19 is a detecting means for detecting that the intestine pushing surface 6A and the intestine receiving surface 9A have faced each other with the predetermined interval D, and for transmitting the second detection signal 20 to the intestine-pushing-member driving means 7. The second detecting means 19 has a proximity sensor for detecting the annular member to be detected 25.

The apparatus 51 operates as follows. The air blowing means 16 blows the air AA intermittently at predetermined periods toward the intestine pushing member 6 from the air nozzle 17 which moves in the direction of arrow BB. The air nozzle 17 moves at a predetermined speed correlated to the transporting speed V of the transporting means. In the air-blowing process, the air AA pushes and advances the intestine pushing member 6 in the direction toward the distal end 4A. In the process during which air is not blown, the intestine pushing member 6 cancels the pushing against the shirred portion 5A. Such intermittent pushing prevents excessive

compression which can occur in the shirred portion 5A. The proximity sensor of the second detecting means 19 detects the annular member to be detected 25 which has been pushed and advanced up to the position for determining the predetermined interval D, and transmits the second detection signal 20 to the air-blowing-mode changing means 18. The air-blowing-mode changing means 18, upon receiving the second detection signal 20, changes the mode of blowing air, i.e., the manner of blowing air, so that the air AA will be blown continuously from the air nozzle 17. Since the air nozzle 17 is moved from the stuffing starting position in the direction of BB to blow air, the accuracy of pneumatic action on the intestine pushing member 6 improves. It should be noted, however, that the air nozzle 17 may not be moved in the direction of BB, and may be disposed in such a manner as to be fixed at the stuffing starting position.

While receiving the air AA being continuously blown out from the air nozzle 17 at a standstill in the illustrated position, the intestine pushing surface 6A of the intestine pushing member 6 moves to the position of the predetermined interval C which is determined by the intestine pushing surface 6A and the intestine receiving surface 9A. The proximity sensor of the detecting means 13 detects the annular member to be detected 25 of the intestine pushing member 6 which reached that position, and transmits the detection signal 14 to the controlling means 15.

Reference numeral 21 denotes a predetermined-interval

setting member for setting the predetermined interval C, and the arrangement provided is such that as the intestine pushing member 6 abuts against the predetermined-interval setting member 21, the intestine pushing surface 6A faces the intestine receiving surface 9A with the predetermined interval C. Although, in this embodiment, an adjustment screw capable of adjusting and setting with precision the magnitude of the predetermined interval C constitutes the predetermined-interval setting member 21, the present invention is not limited to the same, and a shim member having the same thickness as the predetermined interval may be used, for example. Even if this predetermined-interval setting member 21 is not provided, the detecting means 13 is able to detect the intestine pushing member 6 which reached the position where it faces the intestine receiving surface 9A with the predetermined interval C.

When the end portion 5C located at the intestine pushing surface 6A at the time of generation of the detection signal 14 reaches the distal end 4A, the discharging of the material from the distal end 4A is stopped at this point of time of arrival in the same way as with the apparatus 1. Thus, in this embodiment, the shirred portion 5A of the natural intestine casing 5 undergoes a change in form into a completely straight portion 5B by the intestine receiving member 9, and the rear end portion 5C moves while sliding on the stuffing tube 4 having the lengths l and LL at a predetermined speed, so that synchronization can be established between the arrival of the rear end portion 5C at the distal end

4A and the stopping of the material charging.

With this apparatus 51 as well, since the stuffing tube 4 has the length l and the length LL , the magnitude of the predetermined interval C can be set to be smaller. This apparatus 51 in which the predetermined interval C is set to be small is able to shorten the length of the natural intestine casing 5 located in the predetermined interval C , so that the detection accuracy is high.

With this apparatus 51, since the mechanism which operates for pushing the natural intestine casing 5 is constituted by the intestine pushing member 6 alone, the variation of the pushing and advancing force acting on the natural intestine casing 5 is small. The mechanism for pushing the natural intestine casing 5 is extremely simplified. Since the mechanism is based on the intermittent blowing of air, the instantaneous pushing and advancing of the natural intestine casing becomes possible. Since the annular member to be detected 25 is provided, the intestine pushing member 6, while rotating in the direction of arrow A, can be detected by the detecting means 13, thereby making it possible to prevent damage to the rear end portion 5C which can occur by the pressing by the intestine pushing member 6.

The above-described intestine receiving member 9 can be substituted by the intestine receiving member 9 having such rigidity that the intestine receiving surface 9A can be deformed by being pressed by the intestine pushing member 6. This substituted intestine receiving member 9 is a tubular member formed of rubber

and having resiliency similar to that of the braking member 10, and is provided with the hole portion 9B having an inner peripheral portion coming into close contact with the outer peripheral surface of the stuffing tube 4. If the intestine receiving member 9 having such construction is used, the braking member 10 can be omitted.

The apparatus 51 may be provided with an air nozzle 17A. In the process in which the air nozzle 17 is not blowing the air AA, the air nozzle 17A blows air AR onto the intestine pushing member 6 to move the intestine pushing member 6 in the direction of arrow BR. This makes it possible to move the intestine pushing surface 6A away from the rear end portion 5C.

An apparatus 101 for manufacturing natural intestine sausages in accordance with still another embodiment shown in Figs. 3 to 8 has a device 102 for stopping the stuffing of the material into the natural intestine casing.

The apparatus 101 for manufacturing natural intestine sausages is comprised of a base 103; a material supplying means 104 constituted by a gear pump for supplying to a stuffing tube 106 the material to be stuffed into a natural intestine casing 107; a stuffing tube bearing 105 for reciprocatably supporting the stuffing tube 106; the stuffing tube 106 including a distal end 106A for stuffing the material from the material supplying means 104 into the natural intestine casing 107, a small-diameter portion 106B over which the natural intestine casing 107 is fitted, and a large-diameter portion 106C supported by the stuffing tube

bearing 105; the natural intestine casing 107 being fitted over the stuffing tube 106 and divided into a shirred portion 107A and a straight portion 107B; a braking member 108 having a hole portion 108A through which the distal end 106A of the stuffing tube 106 is passed and which has a portion for engaging the natural intestine casing 107 on the stuffing tube 106; a braking-member rotatively driving means 109 for rotatively driving the braking member 108; and a transporting means 110 adapted to transport a stuffed natural intestine casing 111 and including a pair of wrapping connectors 113 which are disposed adjacent to the braking-member rotatively driving means 109 and to which constricting members 112 for constricting the natural intestine casing 111 stuffed with the sausage material are fixed at predetermined intervals, a motor 133 for driving the wrapping connectors 113, two pairs of rotatively driving members 134 around which the wrapping connectors 113 are respectively wound, and two pairs of shafts 135 to which the rotatively driving members 134 are secured.

The device 102 for stopping the stuffing of the material into the natural intestine casing includes an intestine pushing member 114 for pushing a rear end portion 107C of the natural intestine casing 107; an air blowing means 115 for blowing the air AA onto the intestine pushing member 114 so as to push the intestine pushing member 114; an intestine receiving member 116 for receiving a front end portion 107D of the shirred portion 107A of the natural intestine casing 107 being pushed by the intestine

pushing member 114; a detecting means 117 for generating a detection signal F upon detecting the intestine pushing member 114 which has been pushed and advanced by the air blowing means 115; and a controlling means 118 for transmitting a signal FF for stopping the supplying of the material by the material supplying means 104 on the basis of the detection signal F from the detecting means 117. The aforementioned air blowing means 115 constitutes the intestine-pushing-member driving means.

The above-described device 102 is further provided with a second detecting means 119 for generating a detection signal G upon detecting the intestine pushing member 114 which has been pushed and advanced by the air blowing means 115.

The stuffing tube 106 has a rear portion 106D connected to a rod 120A of a reciprocating air cylinder 120, and moves reciprocatingly in the directions of arrow J and arrow K. As shown in Fig. 6, the distal end 106A of the stuffing tube 106 located at a forward end position I is positioned between a line T passing through the rotational centers of the shafts 135 of the transporting means 110 and a common tangential line SS tangential to a pair of locus circles S of tips 112A of the constricting members 112 rotating about the respective shafts 135. The distal end 106A is located in such a manner as to project by the length l from the braking member 108.

The braking-member rotatively driving means 109 is fixedly provided on the base 103 and includes a housing 121, an

intestine-receiving-member attaching member 122 accommodated rotatably inside the housing 121, and a braking-member receiving member 123 for restricting the position of the braking member 108 in the direction of arrow J. The intestine-receiving-member attaching member 122 includes a boss portion 122C having an end face 122A and an end face 122B, as well as a hole portion 122D provided in the boss portion 122C. The hole portion 122D receives the stuffing tube 106 having the distal end 106A located at the position where the distal end 106A projects by the length L from the end face 122B toward the transporting means 110 side.

The intestine pushing member 114 includes a small-diameter portion 114B including an intestine pushing surface 114A formed by a flat surface, a large-diameter portion 114D including an air receiving surface 114C formed by a concave surface, a hollow cylindrical member 114-1 made of a resin material and having a hole portion 114E with an inner peripheral surface which is supported by the outer peripheral surface of the stuffing tube 106, and an annular member to be detected 114-2 which is made of a metal and is fitted over an outer periphery of the large-diameter portion 114D.

The air blowing means 115 includes an air nozzle 125 having an air outlet 125A, an air cylinder 126 having a rod 126A to which the air nozzle 125 is fixed so as to reciprocate the air nozzle 125 between a retracted end position M1 and a forward end position M2 of the air nozzle 125, and an air-blowing-mode changing means

127.

The air-blowing-mode changing means 127 is a means for changing the mode of blowing air onto the intestine pushing member 114, i.e., the manner (continuous blowing, intermittent blowing, the volume of air, air pressure, etc.) of blowing air onto the intestine pushing member 114, on the basis of the detection signal G from the second detecting means 119. The air-blowing-mode changing means 127 includes an air-blowing-mode controlling means 128 having a storage means 128A in which a plurality of air-blowing modes are stored, and an air controlling means 129 having a valve, a regulator, and other pneumatic equipment which are controlled by the air-blowing-mode controlling means 128. Stored in the storage means 128A are an air blowing mode N for pushing and advancing the intestine pushing member 114 toward the second detecting means 119, as well as an air blowing mode O for pushing and advancing the intestine pushing member 114 detected by the second detecting means toward the intestine receiving member 116.

The intestine receiving member 116 is a hollow cylindrical member having a hole portion 116A, a hole portion 116B, and an intestine receiving surface 116C formed by a flat surface defined by the hole portion 116A and the hole portion 116B, and is fitted in the hole portion 122D of the intestine-receiving-member attaching member 122. The hole portion 116A receives therein the small-diameter portion 114B of the intestine pushing member 114, while the hole portion 116B converts the shirred portion 107A into

the straight portion 107B. The intestine receiving surface 116C is spaced apart by the length LL from the distal end 106A located at the forward end position I, and is located in the hole portion 122D.

The detecting means 117 detects that the intestine pushing surface 114A and the intestine receiving surface 116C have faced each other with the predetermined interval C, and transmits the detection signal F to the controlling means 118 and the air blowing means 115 (Fig. 5). The detecting means 117 has a proximity sensor 131 mounted on a bracket 130 secured to the housing 121, the proximity sensor 131 being adjustable in the directions of arrow P and arrow Q.

The second detecting means 119 has a proximity sensor 132 for detecting that the intestine pushing surface 114A and the intestine receiving surface 116C have faced each other with the predetermined interval D, and for transmitting the detection signal G to the air-blowing-mode controlling means 128 (Fig. 4). The proximity sensor 132 is mounted on the bracket 130 in such a manner as to be adjustable in the directions of arrow P and arrow Q.

The detecting means 117 and the second detecting means 119 are not limited to the proximity sensors, and are sufficient if they are respectively capable of detecting the positions of the intestine pushing member 114. For example, it is possible to use known sensors including photoelectric sensors, capacitive sensors, laser sensors, mechanical limit switches, or the like.

The apparatus 101 operates as follows. First, the natural intestine casing 107 is fitted over the stuffing tube 106 at a standstill at a retracted end position H. Next, the air cylinder 120 and the air cylinder 126 are respectively actuated to move the stuffing tube 106 toward the forward end position I, and the air nozzle 125 at the retracted end position M1 is moved to the forward end position M2. When the stuffing tube 106 reaches the forward end position I, the rotation of the stuffing tube 106 in the direction of A and the supply of the material by the material supplying means 104 are started.

When stuffing is started, the stuffed casing 111, in which a twisted portion 111A is formed at its portion where it is constricted by the constricting members 112 travelling at the transporting speed V in the direction of arrow E, pulls out the straight portion 107B from the distal end 106A. Consequently, the shirred portion 107A has its length 11 reduced gradually. Air is periodically blown out intermittently from the air outlet 125A onto the air receiving surface 114C in accordance with the air blowing mode N, so that the intestine pushing member 114 is pushed and advanced toward the intestine receiving member 116.

When the intestine pushing surface 114A reaches the position of the predetermined interval D determined by the intestine pushing surface 114A and the intestine receiving surface 116C, and faces the intestine receiving surface 116C with the predetermined interval D, the proximity sensor 132 detects the annular member

to be detected 114-2 and generates the detection signal G (Fig. 4). Upon receiving the detection signal G, the air-blowing-mode controlling means 128 finishes the air blowing mode N, and at the same time selects the air blowing mode O for continuously blowing out air with a small air volume, a lower air pressure, and a low air speed, and effects a change into that mode. The intestine pushing member 114 upon receiving the air pressure based on the air blowing mode O continuously approaches the intestine receiving surface 116C.

When the intestine pushing surface 114A reaches the position of the predetermined interval C determined by the intestine pushing surface 114A and the intestine receiving surface 116C, and faces the intestine receiving surface 116C with the predetermined interval C, the proximity sensor 131 detects the annular member to be detected 114-2 and transmits the detection signal F to the controlling means 118 (Fig. 5), whereupon the controlling means 118 stops the supplying of the material by the material supplying means 104 when the rear end portion 107C reaches the distal end 106A. At the same time, the blowing out of air by the air blowing means 115 is stopped. Upon completion of the material charging into the natural intestine casing 107, the stuffing tube 106 retracts in the direction of arrow K to return to the retracted end position H so as to prepare for the ensuing fitting of the natural intestine casing 107 over the stuffing tube 106.

With this apparatus 101 as well, in the same way as the

above-described apparatus 1, the controlling means 118, upon receiving the detection signal F, may control the speed of the motor 133 to change the transporting speed V of the transporting means 110, such that the rear end portion 107C reaches the distal end 106A at the point of time when the discharging of the material from the stuffing tube 106 has stopped.

With this apparatus 101 as well, in the same way as the above-described apparatus 1, it is possible to provide the detecting means 117 for generating the detection signal F upon detecting that the intestine pushing surface 114A and the intestine receiving surface 116C have contacted each other, as shown in Fig. 7.

With the apparatus 101, since the distal end 106A extends up to the position between the line passing through the rotational centers of the shafts 135 and the tangential line SS (Fig. 6), it is possible to set a smaller predetermined interval C. In addition, since the intestine receiving surface 116C is located inside the hole portion 122A, and the length LL from the intestine receiving surface 116C to the distal end 106A can be shortened (Fig. 7), this arrangement is suitable for using the natural intestine casing 107 of the type which is difficult to slide on the stuffing tube 106.

Although, in Fig. 4, illustration is given of the example in which the intestine receiving member 116, the braking member 108, and the braking-member receiving member 123 are used, Fig. 8 shows an example in which an intestine receiving member 124 formed

of resilient rubber is used instead of these members. The intestine receiving member 124 is a hollow cylindrical member made of rubber and including an end portion 124B having an intestine receiving surface 124A, a small-diameter hole portion 124C provided in the end portion 124B and adapted to come into close contact with the outer peripheral surface of the stuffing tube 106, a body 124D having a length L1 and formed integrally with the end portion 124B, a large-diameter hole portion 124E provided in the body 124D, and an end face 124B1 of the end portion 124B. The intestine receiving member 124 is mounted by being fitted in the hole portion 122D of the intestine-receiving-member attaching member 122. The intestine receiving surface 124A is formed by a conical surface which is inclined toward the hole portion 124C, and the intestine receiving surface 124A determines the predetermined interval C in cooperation with the intestine pushing surface 114A. When the intestine pushing surface 114A reaches the position of the predetermined interval C, and faces the intestine receiving surface 124A in a state of being nonparallel with the intestine receiving surface 124A with the predetermined interval C, the proximity sensor 131 detects the annular member to be detected 114-2, and transmits the detection signal F to the controlling means 118.

In the intestine receiving member 124, the hole portion 124C changes the shirred portion 107A into the straight portion 107B, and brakes the movement of the straight portion 107B in the direction of arrow E. The end portion 124B of the intestine receiving member

124 also has the function of the aforementioned braking member 10 or 108.

The end portion 124B of the intestine receiving member 124 may have rigidity and resiliency equivalent to those of the aforementioned braking member 10 or 108. Even if the intestine receiving member 124 has such rigidity that deformation occurs in the intestine receiving surface 124A due to the action of the pressing force by the intestine pushing member 114, the proximity sensor 131 is capable of detecting the intestine pushing member 114, thereby making it possible to stop the supplying of the material.

Since the hole portion 124E of the intestine receiving member 124 is open from the intestine receiving surface 124A in the advancing direction of the intestine pushing member 114, the material attached to the inner peripheral surface of the hole portion 124E can be easily removed, with the result that a hindrance is unlikely to occur to the movement of the straight portion 107B on the stuffing tube 106 due to the attachment of the material thereto. Since the length LL from the intestine receiving surface 124A to the distal end 106A is shorter than the length LL using the intestine receiving member 116 shown in Fig. 7, this arrangement is suitable for use of the natural intestine casing 107 which is difficult to slide. Since the stuffing tube 106 has the large-diameter portion 106C, runout of rotation is difficult to occur. Since the intestine pushing member 114 which rotates about

the stuffing tube 106 is also difficult to undergo runout in rotation, the accuracy of detection of the intestine pushing member 114 by the proximity sensor 131 is high.

In the same way as the above-described apparatus 51, this apparatus 101 may be also provided with an air nozzle 125A for blowing the air AR onto the intestine pushing member 114 in the process in which the air nozzle 125 is not blowing the air AA, so as to move the intestine pushing member 114 in the direction of arrow K.

This apparatus 101 may be so arranged that the air nozzle 125 does not reciprocate in the directions of arrows J and K. The air nozzle 125 may be fixed at, for example, the forward end position M2, and the air AA may be blown onto the intestine pushing member 114 at this position from the start of stuffing until the end of stuffing. In this case, the air nozzle 125 has its shape and its fixing structure such that the intestine pushing member 114 which moves together with the stuffing tube 106 moving toward the forward end position I does not collide against the air nozzle 125.

Fig. 9 shows an apparatus 151 which is not provided with the second detecting means as a further embodiment of the invention. The apparatus 151 is comprised of an intestine receiving member 152 which is a rubber-made hollow cylindrical member including an end portion 152B having an intestine receiving surface 152A, a small-diameter hole portion 152C provided in the end portion 152B, a body 152D having the length L1 and formed integrally with

the end portion 152B, and a large-diameter hole portion 152E provided in the body 152D; an intestine-receiving-member attaching member 153 including a boss portion 153C having an end face 153A and an end face 153B, which together determine the length L2, and a hole portion 153D provided in the boss portion 153C; a transporting means 154; a stuffing tube 155 having a distal end 155A located at a position where it projects by the length L from the end face 153B toward the transporting means 154 side; an intestine pushing member 156 having an intestine pushing surface 156A; an intestine-pushing-member driving means 157 for pushing and advancing the intestine pushing member 156 toward the distal end 155A of the stuffing tube 155; a detecting means 158; and a material supplying means 159.

The intestine receiving member 152 is mounted by being fitted in the hole portion 153D such that the intestine receiving surface 152A is flush with the end face 153A. The hole portion 152C is designed to change the shirred portion 107A into the straight portion 107B, and has an inner peripheral portion for coming into contact with the outer peripheral surface of the straight portion 107B. The inner peripheral portion of the hole portion 152C faces the outer peripheral surface of the stuffing tube 155 in a state of close contact therewith or with a gap therewith. The intestine pushing member 156 has an annular member to be detected 160, and the detecting means 158 has a proximity sensor 161 for detecting the annular member to be detected 160. In the same way as the

apparatus 1 and the apparatus 101, an arrangement may be provided such that the intestine receiving surface 152A is located in such a manner as to project toward the proximity sensor 161 side from the end face 153A. The end portion 125B of the intestine receiving member 125 also has the function of the aforementioned braking member 10 or 108.

With the apparatus 151, the proximity sensor 161 generates the detection signal F upon detecting the annular member to be detected 160 of the intestine pushing member 156 located at the position where the intestine pushing surface 156A and the intestine receiving surface 152A have contacted each other. The supplying of the material by the material supplying means 159 is stopped when the rear end portion 107C which was at the intestine receiving surface 152A at the time of the generation of the detection signal F moved by the length LL from the intestine receiving surface 152A and reached the distal end 155A.

The intestine receiving member 152 may have rigidity and resiliency of such a measure that deformation is caused in the intestine receiving surface 152A due to the action of the pressing force by the intestine pushing member 156. If the intestine pushing surface 156A and the intestine receiving surface 152A are in a state of virtual contact with each other, the detecting means 158 is able to detect that state. Alternatively, the detecting means 158 may detect a very small predetermined interval C, thereby making it possible to stop the supplying of the material.

With the apparatus 151, since the length LL from the intestine receiving surface 152A to the distal end 155A, i.e., the moving length of the rear end portion 107C, is long, it is possible to cope with the stuffed natural intestine casing 111 which is transported at a faster transporting speed V. Since the intestine receiving surface 152A of the intestine receiving member 152 is not located inside the hole portion 153D of the intestine-receiving-member attaching member (rotating pulley) 153, the material attached to the intestine receiving surface 152A can be easily removed. Since the intestine receiving member 152 has the length L1 and is fitted in the hole portion 153D, the positional accuracy of the intestine receiving surface 152A is high. As for the hole portion 152D of the intestine receiving member 152, in the same way as the hole portion 124E of the aforementioned intestine receiving member 124, a hindrance is unlikely to occur to the movement of the straight portion 107B on the stuffing tube 155 due to the attachment of the material thereto.

With the above-described apparatuses 1, 51, 101, and 151, since the intestine pushing member 6, 114, or 156 for pushing the natural intestine casing 5 or 107 is directly detected, it is possible to accurately detect the position of the intestine pushing member 6, 114, or 156. Even if the intestine pushing members 6, 114, or 156 which rotates at high speed in the direction of arrow A while scattering water attached to the natural intestine casing 5 or 107 is directly detected, if detection is effected by using

the proximity sensors 13 and 19, the proximity sensors 131 and 132, or the proximity sensor 161, high-accuracy detection continues.

The detecting means in accordance with the invention may not only directly detect the intestine pushing member, but also indirectly detect the position of the intestine pushing member by detecting the position of a member or a means which moves in synchronism with the intestine pushing member, e.g., the intestine-pushing-member driving means which is mechanically linked with the intestine pushing member.

Since the apparatus 1, 51, or 101 has the second detecting means 19 or 119 for changing the intestine pushing mode, a program for pushing and advancing the natural intestine casing can be simplified, and the timing for changing the manner of pushing and advancing the intestine in conformity with the size and physical properties of the natural intestine casing 5 or 107 used is adjustable. The apparatus 1, 51, or 101 may be so arranged as not to be provided with the second detecting means 19 or 119 in the same way as the apparatus 151, and the apparatus 151 may be provided with the second detecting means to the contrary. In the arrangement in which the second detecting means is not provided, the intestine pushing member 6 or 114 may be detected by the detecting means 13 or 117 without changing the manner of pushing and advancing the intestine pushing member 6 or 114 by the intestine-pushing-member driving means 7 or 115 after the start

of the stuffing of the material into the natural intestine casing 5 or 107. The intestine-pushing-member driving means 7 or 115 may continue to apply, for example, the intermittently pushing and advancing force against the intestine pushing member 6 or 114, or may continue to apply, for example, the continuously pushing and advancing force against it. In the case where the intermittently pushing and advancing force is applied, the period of pushing and advancing by the intestine-pushing-member driving means 7 or 115 is preferably set so that the detection signal 14 or F is generated in a state in which the intestine pushing member 6 or 114 has pushed and advanced the rear end portion 5C or 107C, but the invention is not limited to the same. In the case where the continuously pushing and advancing force is applied, the pushing and advancing force of the intestine-pushing-member driving means 7 or 115 is set to such a weak pushing and advancing force that the shirred portion 5A or 107A is not too strongly pushed against the intestine receiving surface 9A or 116C.

In accordance with the above-described apparatus 1, 51, or 101, since the intestine pushing member is pushed and advanced only by the blowing of air, the variation of the length of the natural intestine casing pinched by and between the intestine pushing surface of the intestine pushing member and the intestine receiving surface of the intestine receiving member, which face each other with a predetermined interval, is small. Accordingly, the apparatus of the invention is suitable for detecting the length

of the natural intestine casing remaining on the stuffing tube. In addition, the intestine pushing member can be pushed and advanced by the simple method of only blowing air.

Since the stuffing tube is made to project from the intestine receiving member, the interval between the intestine pushing member and the intestine receiving member at the time of the generation of the signal for stopping the supplying of the material can be made vary small or zero. Consequently, since the variation of the length of the natural intestine casing remaining on the stuffing tube at the time of the generation of the signal for stopping the supplying of the material can be suppressed to a vary small level, the sausage material can be stuffed with high accuracy up to the rear end portion of the natural intestine casing.

INDUSTRIAL APPLICABILITY

In accordance with the invention, since synchronization is established between the movement of the natural intestine casing and the stopping of the supplying of the material by causing the stuffing tube to project from the intestine receiving member, it is possible to provide a method and an apparatus for manufacturing natural intestine sausages, which excel in sanitation and make it possible to reduce the waste of the natural intestine casing and the material.

In accordance with the invention, since the signal for stopping the supplying of the material into the natural intestine

casing can be generated with high accuracy by causing the stuffing tube to project from the intestine receiving member, it is possible to provide a method and an apparatus for manufacturing natural intestine sausages, which excel in sanitation and make it possible to reduce the waste of the natural intestine casing and the material.

In accordance with the invention, since the signal for stopping the supplying of the material into the natural intestine casing can be generated with high accuracy, following the advancing of the rear end portion of the natural intestine casing by a simple method, it is possible to provide a method and an apparatus for manufacturing natural intestine sausages, which excel in sanitation and make it possible to reduce the waste of the natural intestine casing and the material, and further to provide an inexpensive apparatus for manufacturing the same.